Division of Agricultural Sciences
UNIVERSITY OF CALIFORNIA

An Economic-Statistical Analysis of Egg Prices Paid by Retailers in the San Francisco Bay Area, 1952-1955

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CALIFORNIA AGRICULTURAL EXPERIMENT STATION
GIANNINI FOUNDATION OF AGRICULTURAL ECONOMICS

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AN ECONOMIC-STATISTICAL ANALYSIS OF EGG PRICES PAID BY RETAILERS IN THE SAN FRANCISCO BAY AREA, 1952-1955

by

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Introduction

The objective of this study is to quantify the relationships between prices paid by retailers and quantities sold of the various sizes and grades of eggs in the San Francisco Bay area consisting of Marin, San Francisco, San Mateo, Contra Costa, and Alameda counties.

As is usually the case in economic analyses, the data that are easily available do not measure precisely the economic quantities of interest. The prices used are not average prices for all egg sales but are those quoted by the San Francisco office of the Poultry Producers of Central California (PPCC), a producers' cooperative and the largest egg handler in the San Francisco Bay area. These prices refer to cartoned eggs delivered to the retail stores. Stores handling more than five cases weekly received a 2-cent-per-dozen discount.

These prices are administered prices selected by the management of PPCC after careful consideration of market conditions. As a consequence, they tend to be more stable over time than would be true for, say, auction prices. For example, in 1955, the quoted price paid by retailers for Large AA eggs remained at 52 cents per dozen from May 23-July 11. Subsequent analysis will make clear, however, that even administered prices are influenced greatly by economic forces.

Daily prices were obtained for the years 1952 through 1955 for some 14 categories. However, only prices for the four most important retail categories--Large AA, Large A, Medium A, and Small A--are used. These grades comprised some 90 per cent of total sales reported.

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Even though prices were obtained from only one source, there is a strong presumption that these prices are representative of the entire market. The same cannot be said for the sales data. Weekly sales by size and grade were obtained from only two companies--PPCC and Brentwood--that handled together about 42 per cent of total egg sales in the Bay area.[1/] There is an implicit assumption in much of what follows that the combined market share of these two companies has at least remained approximately constant during the interval for which data were collected.[2/]

PPCC operates in an area extending in a narrow strip up and down the northern California coast from Eureka to Monterey with a bulge around the San Francisco Bay area extending well into the San Joaquin Valley. It is not surprising that exact sales data could not be found that coincided with the geographic area specified above--the five Bay area counties. Approximately 15 branch offices submitted data on weekly sales by size and grade to the main office in San Francisco. Weekly sales from three offices were selected and used--San Francisco, Oakland, and Hayward. In 1953 these three offices handled about 60 per cent of PPCC egg sales.[3/] The San Francisco office served the entire West

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1/ The estimate of 42 per cent was made in the following way:

(a) Total reported sales for thirteen 28-day periods in 1955 were computed from the data in Appendix Table A-1, 26.372 million dozen eggs.

(b) This total was multiplied by 12 eggs per dozen and divided by the 1955 total population in the San Francisco Bay area, Appendix Table A-3, 2.441 million persons, to obtain per-capita sales, 136.5 eggs per person.

(c) This figure was then divided by an estimate of California per-capita consumption in 1955, 362 eggs per person, derived by Dr. Stanley Seaver in an unpublished manuscript analyzing the California egg market. The ratio obtained corresponds to 37.7 per cent of California per-capita consumption. Since only six retail categories comprising some 90 per cent of sales were included, total sales of PPCC and Brentwood in the San Francisco Bay area were estimated to be 42 per cent--37.7 divided by 0.9.

2/ A similar procedure as described in footnote 1 was used for 1952, resulting in an estimate of 45 per cent. This result lends support to this implicit assumption that the combined market share of PPCC and Brentwood was relatively constant during the period of analysis.

3/ Tinley, J. M., and H. E. Erdman, Operating Problems of a Cooperative Poultry and Feed Association (Berkeley: 1957), Table 9, p. 41 (California Agricultural Experiment Station Bul. 759.)

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Bay from San Rafael to Palo Alto. The Oakland office served the East Bay from Vallejo to San Leandro. The Hayward office served the lower part of the East Bay. No adjustment was required for sales from the Oakland and Hayward offices. Overseas shipments, however, were included in San Francisco sales. Daily invoices were used to compile weekly overseas shipments by size and grade, and these were subtracted from San Francisco weekly sales to obtain net local sales. The invoices for November, 1953, were lost and no data were available for this period. Weekly sales for the four most important categories listed above were recorded. One minor modification was made. Sales of Jumbo A and Extra Large A--relatively insignificant categories--were included in Large A sales.

Brentwood, distributing eggs to Safeway, recorded sales in much the same way as PPCC by weeks and by size and grade. The sales week was the same as that used by PPCC. Sales from individual routes were recorded separately. Some routes, serving primarily stores outside the Bay area, were excluded even though they also distributed eggs to a few Bay area stores. The alternative procedure was to sort through daily sales slips to obtain sales for the few stores erroneously excluded. The substantial additional work was not believed to be warranted. Sales records were not available for the period prior to April, 1952.

During the period studied, there were significant inshipments of eggs into California. For example, in 1955 more than 1,500,000 cases of eggs were imported from other states--largely from the Midwest. Consequently, a price series was selected to represent midwestern eggs. Chicago average monthly wholesale prices of large extras, 60 per cent A's or better, were used for comparison with local prices.1/

The weekly data were aggregated into 28-day periods. An unweighted 28-day average price was computed for each period for each of the four categories--Large AA, Large A, Medium A, and Small A. The largest single category omitted was commercial eggs, a grade that was not handled by a large majority of retail stores. Of the four grades used, Large AA averaged 57 per cent, Large A averaged 15 per cent, Medium A averaged 24 per cent, and Small A, about 4 per cent of egg sales of the two companies from which sales data were obtained. These proportions, of course, vary seasonally.

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1/ See Appendix Table A-4.

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* See Appendix Table A-6.

Qualitative Analysis

In order to detect trends, marked patterns of variation, and relationships between series, the various time series were graphed.

It is clear from Figure 1 that Large AA prices tend to be high in the fall months and somewhat lower in the spring. During the periods when Large AA prices are high, the spread between Large AA and Small A tends to be substantially increased.

These tendencies are even more clearly revealed in Figure 2 where price ratios are plotted. The price ratio of Large A to Large AA shows no particular pattern of variation, while the ratios of Medium A to Large AA and Small A to Large AA exhibit a similar and marked seasonal variation.

Sales by size and grade are graphed in Figure 3. The sale of large eggs is heaviest in the winter and spring months, while the sale of small eggs is relatively greater in the fall. This seasonal pattern arises from the practice of starting chicks in the spring to replace older hens in the fall. A comparison of Figures 1 and 3 indicates that the prices for Large AA are inversely related to sales of Large AA--high prices are associated with relatively small quantities. On the other hand, wide margins between Large AA and Small A prices are associated with relatively large quantities of Small A eggs.

Figure 4 illustrates sales ratios and further substantiates these relationships.

The Economic Model

The qualitative and graphic analysis suggests that the prices and quantities of the several egg categories are closely interrelated. The relative uniformity of the ratio between Large AA and Large A prices and their similar seasonal patterns further suggest that these two categories can be reasonably combined into a single "large " category. For parallel reasons medium and small eggs are combined into a single "small" category.

Prior to statistical analysis, it is necessary to specify the principal economic characteristics of the San Francisco Bay area egg market.

At prices prevailing during the period studied, local production of large eggs was not adequate to supply the quantity of eggs demanded. Eggs were shipped in--largely from the Midwest--to make up the deficit. This suggests that, on the average, the local price of large eggs was just high enough to

In order to detect trends [illegible] of variables, and relations [illegible] period, the previous three months were compared.

1. To chart those [illegible] I then [illegible] AA prices found to be high in the fall months, and somewhat lower in the spring. During the months when Large AA [illegible] only, one agreed Brown Large AA and Small A tend to be substantially [illegible].

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[illegible] by eye and [illegible] in Figure 3. The sale of Large [illegible] is lowest in the winter and spring months, while the sale of Small eggs is relatively greatest in the fall. The seasonal pattern [illegible] 2 the possible [illegible] choice in the matter to replace older hens in the area. A comparison of Figures 1 and 3 indicates that the prices for Large AA are inversely related to [illegible] of Large AA prices are associated with relatively small [illegible]. The [illegible] with [illegible], while [illegible] between Large AA and Small A [illegible] associated with [illegible] position of Small A eggs.

Figure 4 illustrates other [illegible] and further [illegible] these relationships.

The Supply Situation

The [illegible] and graph [illegible] the [illegible] and quantities of the seasonal egg [illegible] clearly [illegible]. The relative [illegible] of the ratio of Large AA and Large A prices and their elasticities combined into a single "Large" category. The [illegible] and [illegible] [illegible] into a single "small" category.

Before the [illegible] analysis, it is necessary to [illegible] the problem [illegible] of the [illegible] of the [illegible] [illegible].

In [illegible] [illegible] during the past [illegible]. Local [illegible] of large eggs was [illegible] to supply the [illegible] of [illegible]. [illegible] [illegible] [illegible] by [illegible] from the [illegible] to the [illegible]. This [illegible] [illegible], a [illegible], the [illegible] price of large eggs was just [illegible] to

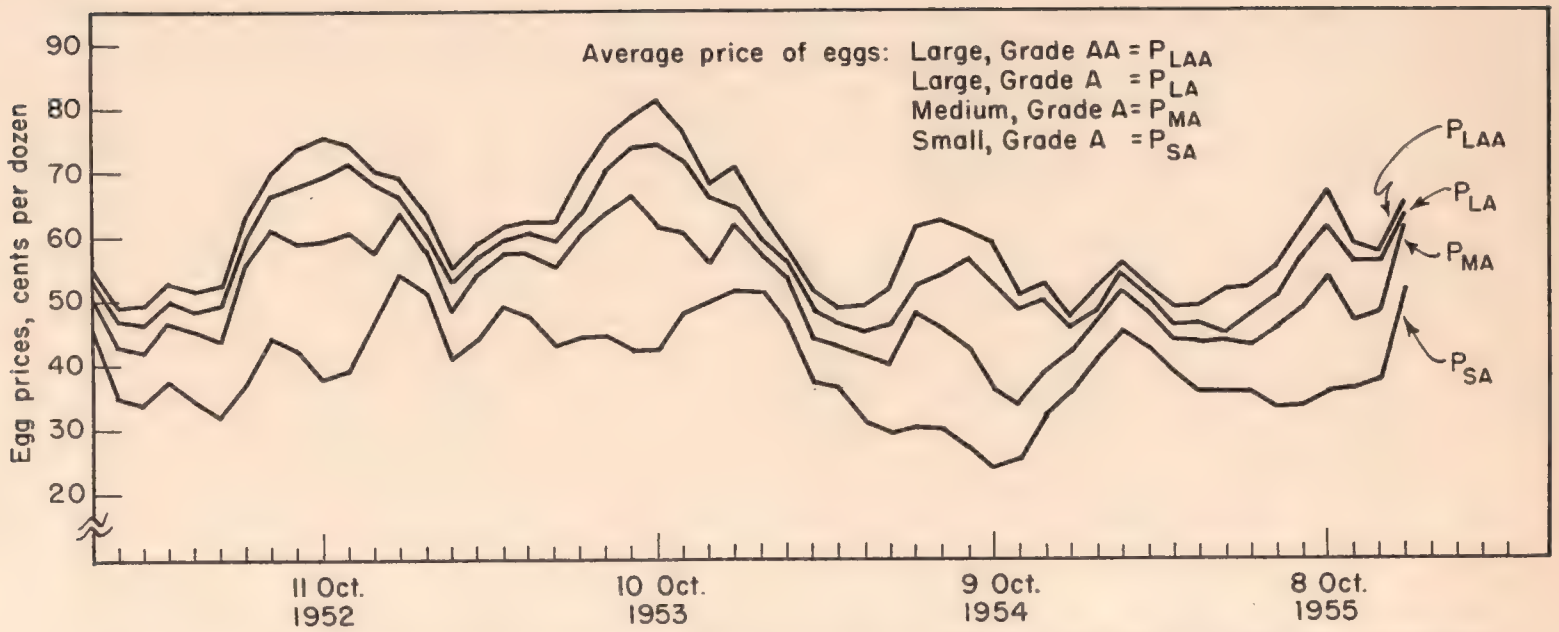

Figure 1. Twenty-Eight-Day Average Egg Prices, by Size and Grade, San Francisco Bay Area, 1952-1955

Source: Appendix Table A-1.

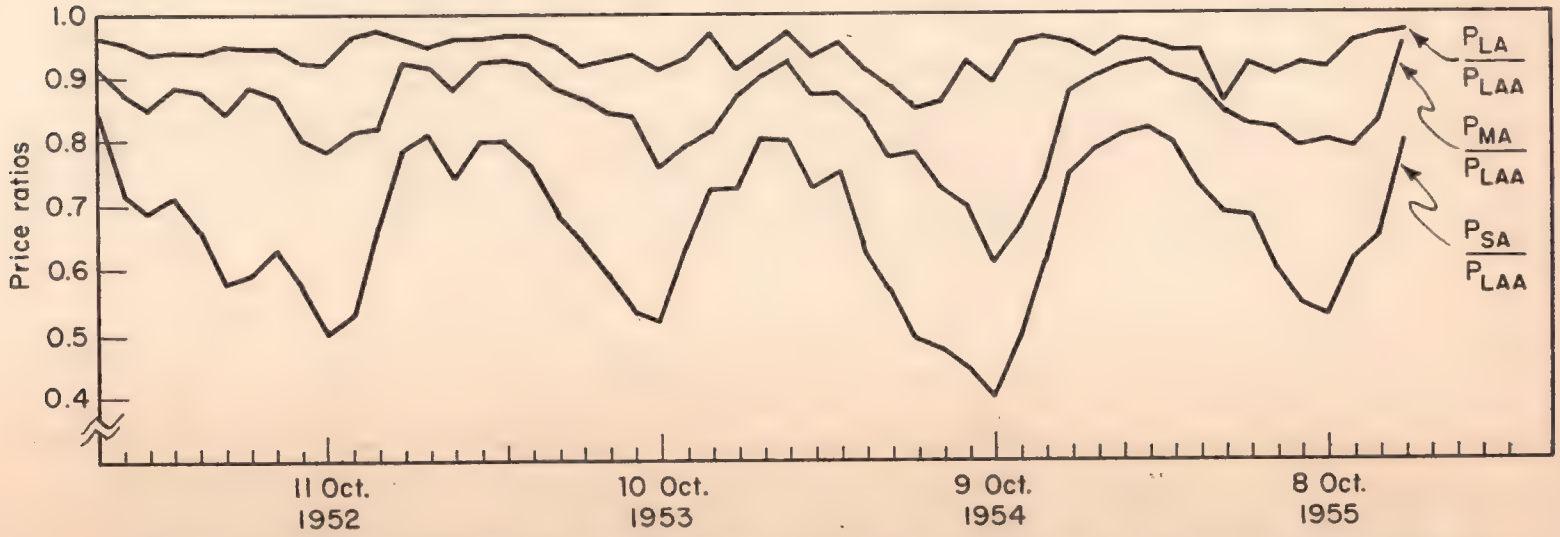

Figure 2. Ratios of 28-Day Average Egg Prices, by Size and Grade, San Francisco Bay Area, 1952-1955

Source: Appendix Table A-8.

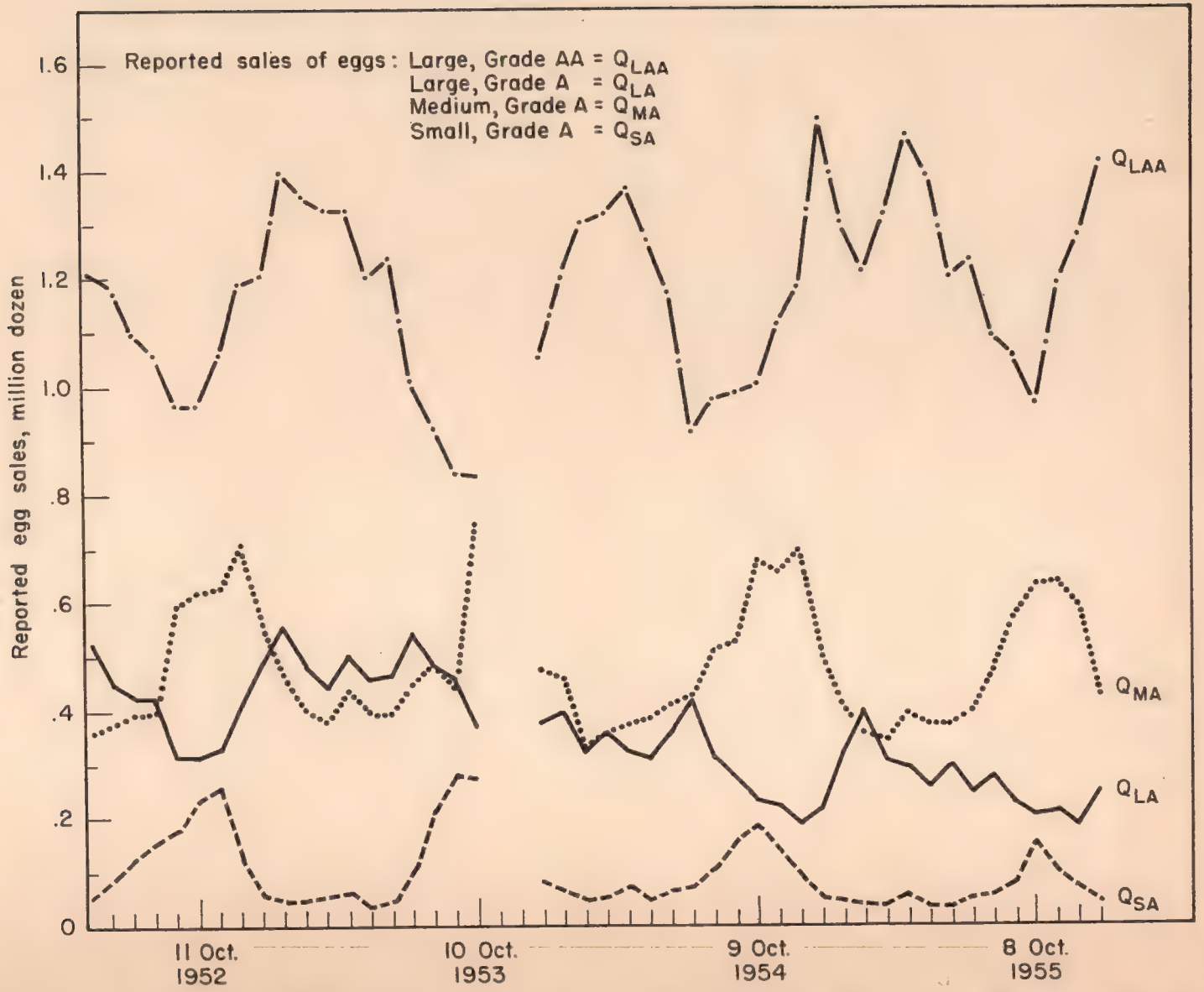

Figure 3. Reported Egg Sales, 28-Day Totals, by Size and Grade, San Francisco Bay Area, 1952-1955

Source: Appendix Table A-1.

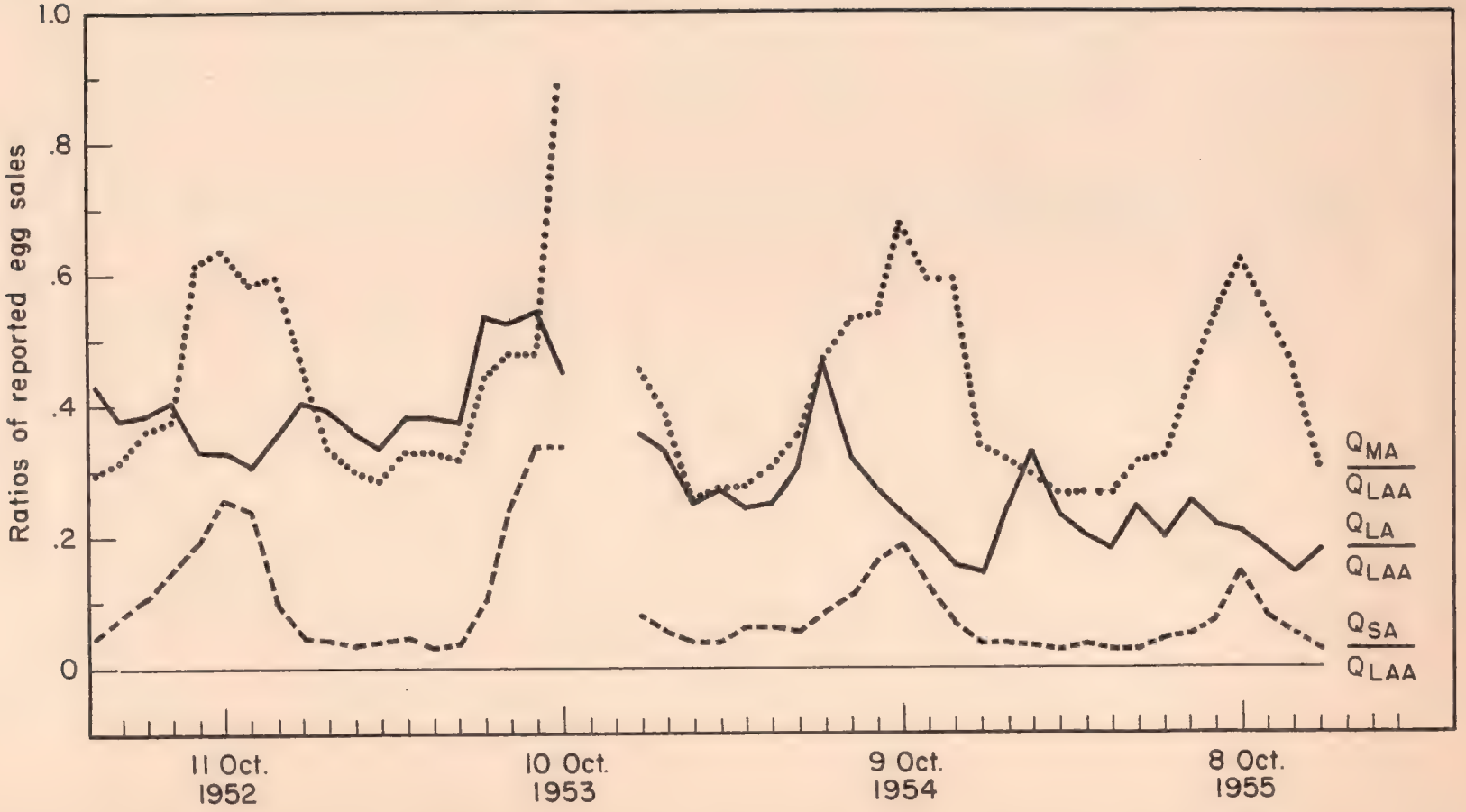

Figure 4. Ratios of Reported Egg Sales, by Size and Grade, San Francisco Bay Area, 1952-1955

Source: Appendix Table A-9.

make inshipments attractive. A higher price would have attracted greater imports and created an excess supply. A lower price, on the other hand, would have reduced imports and caused an inadequate supply. Consequently, the principal determinant of local large egg prices was the level of large egg prices in the exporting region--the Midwest.

Small eggs are not likely to be shipped in from the Midwest. Consequently, the local supply of small eggs is largely determined by flock replacement policies. Local sales of small eggs, however, may not coincide with local production. During periods of peak production of small eggs, the local price may be sufficiently low to induce shipment to other regions. It is assumed in subsequent analysis that the quantities of such exports are of minor importance. Under these conditions the major determinants of the price of small eggs are: (1) the price of large eggs since these are close substitutes for most consumers and (2) the quantity of small eggs produced (and sold). In other words, small egg prices are likely to be set to clear the market. Over time, variation in population and per-capita income is also likely to affect the level of price that will clear the market of small eggs.

Large egg sales are made up of local production plus imports from other United States egg-producing regions. The major determinants of large egg sales are: (1) the price of large eggs, (2) the price of small eggs, (3) population, and (4) consumer income.

To summarize, the quantity of small eggs available in a given season is predetermined by flock replacement policies of egg producers. The price of large eggs is determined by the price of Midwest eggs and the cost of transfer to San Francisco. Given the price of large eggs, the price of small eggs is set to clear the market. Finally, the quantity of large eggs sold during a particular period depends on the prices of both large and small eggs and on consumer income.

Statistical Results

In a sense, the economic model presented in the previous section represents a tentative and generalized hypothesis as to the operation of the San Francisco Bay area egg market. The next step is to test this hypothesis empirically and, at the same time, to quantify the indicated relationships. Technical details of data preparation and statistical procedures are found in the Appendix, page 19.

The first estimating equation quantifies the relationship between the price of large eggs in San Francisco and the price of large eggs in Chicago.[1/] Estimated values of the San Francisco price of large eggs, P_{Lt}, are obtained by inserting the corresponding Chicago prices, P_{Ct}, into the equation:

$$(1)\quad P_{Lt} = 14.476 + 0.991\ P_{Ct}.$$

The constant term, 14.476 cents per dozen, indicates that San Francisco large egg prices were, on the average, about 14 cents per dozen higher than Chicago prices. This differential between San Francisco and Chicago large egg prices is considerably greater than the cost of transfer. However, it includes at least the following additional major components: (1) a 2-cent discount to larger stores, (2) cost of delivery to retail stores, (3) cost of processing, and (4) an allowance for difference in grade. A detailed analysis of each of these components is outside the scope of the present study.

The coefficient associated with P_{Ct}, 0.991, indicates that a 1-cent change in the Chicago price has been associated with approximately a 1-cent change in the same direction in the local price of large eggs. The relationship between San Francisco and Chicago large egg prices is illustrated by Figure 5. Equation 1 is used to estimate local large egg prices. A comparison between these estimated and actual prices is made in Figure 6. The average difference is 2.98 cents per dozen.[2/]

The second estimating equation quantifies the relationship between the local price of small eggs, the local price of large eggs, and the quantity of small eggs to be sold in the subsequent time period. The local price of small eggs, P_{St}, is estimated by inserting the corresponding values of the local price of large eggs, P_{Lt}, and the local per-capita sales of small eggs in the following time period, $Q_{S,\ t+1}$, into the equation:

$$(2)\quad P_{St} = 2.639 + 1.050\ P_{Lt} - 65.394\ Q_{S,\ t+1}.$$

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1/ The data actually used in deriving the following equations are found in Appendix Table A-6. The estimating equations are listed in Appendix Table A-7.

2/ The figure cited is a quadratic average usually designated as the standard error of estimate.

The first estimating equation quantifies the relationship between the price of large eggs, P_{Lt}, and the local per-capita sales of small eggs in the following equation P_{St} is estimated by inserting the corresponding values of the local price of small eggs to be sold in the subsequent time period. The local price of large eggs, P_{Lt}, is estimated by inserting the corresponding values of small eggs sold in the current time period, q_{St}, and the observed price of large eggs in San Francisco and the price of large eggs in Chicago lagged one period, P_{Ct}, into the equation:

$$(1) \quad P_{Lt} = 1.4476 + 0.291\ P_{Ct} - 0.0000\ q_{St} \qquad (+)$$

The coefficient of determination, R^2 0.991, indicates that a 1-cent change in the Chicago price has been associated with approximately a 1-cent change in the same direction in the local price of large eggs. The relationship between San Francisco and Chicago large egg prices is illustrated by Line 2. Comparison I is used to estimate local large egg prices. A comparison between the estimated and normal prices is made in Figure 6. The average difference is 2.0 cents per dozen.[2]

The second estimating equation quantifies the relationship between the local price of small eggs, the local ratio of large eggs, and the quantity of small eggs to be sold in the subsequent time period. The local price of small eggs, P_{St}, is estimated by inserting the corresponding values of the local price of large eggs, P_{Lt}, and the local per-capita sales of small eggs in the following equation:

$$(2) \quad P_{St} = 2.6252 + 1.0130\ P_{Lt} - 69.7\ q_{St+1} \qquad (+)$$

1/ The data actually used in deriving the following equations are listed in Appendix Table A-6. The estimating equations are listed in Appendix Table A-5.

2/ The figure cited is a quadratic average usually designated as the standard error of estimate.

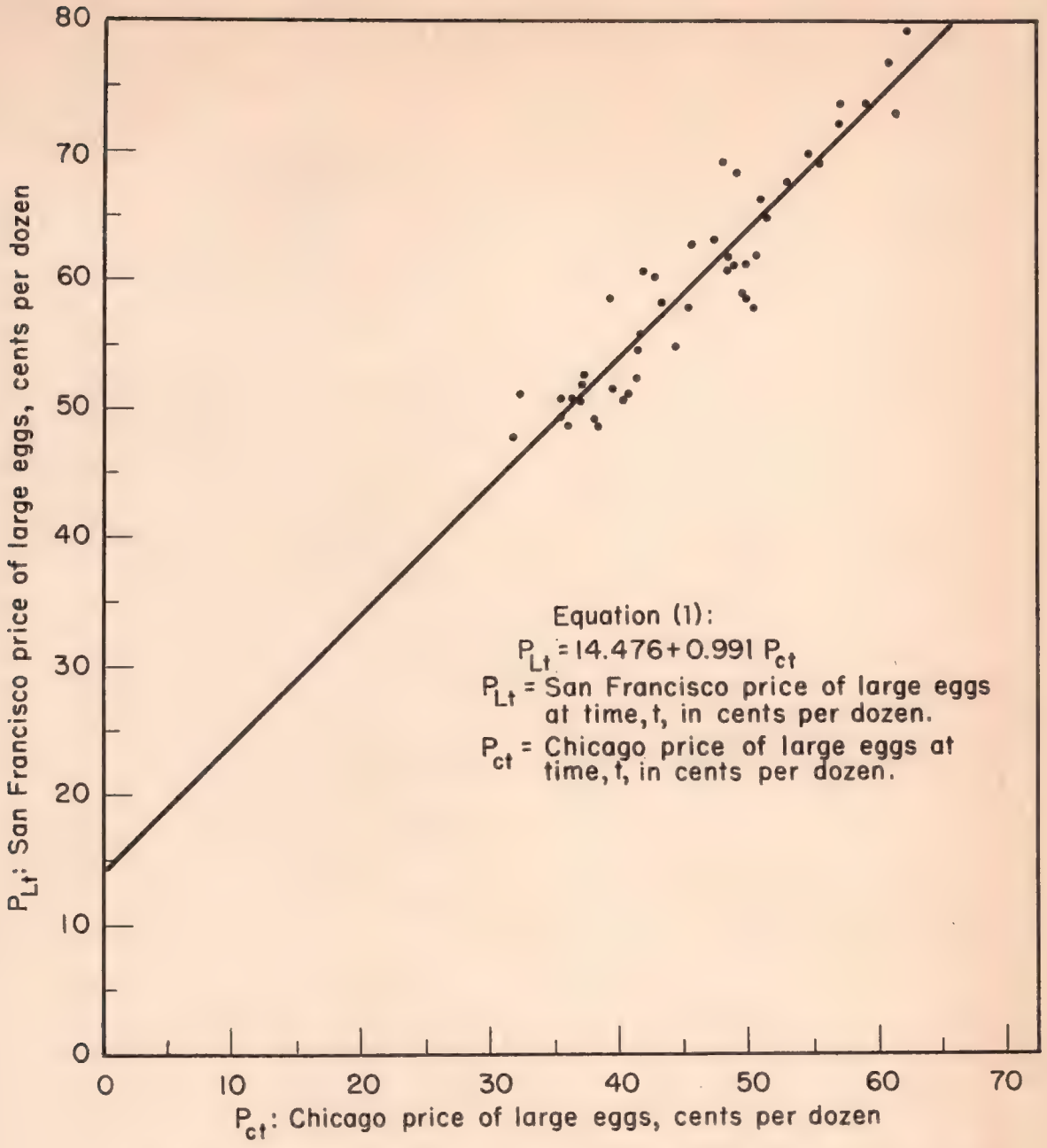

Figure 5. Average Relationship Between the Price of Large Eggs in the San Francisco Bay Area and in Chicago

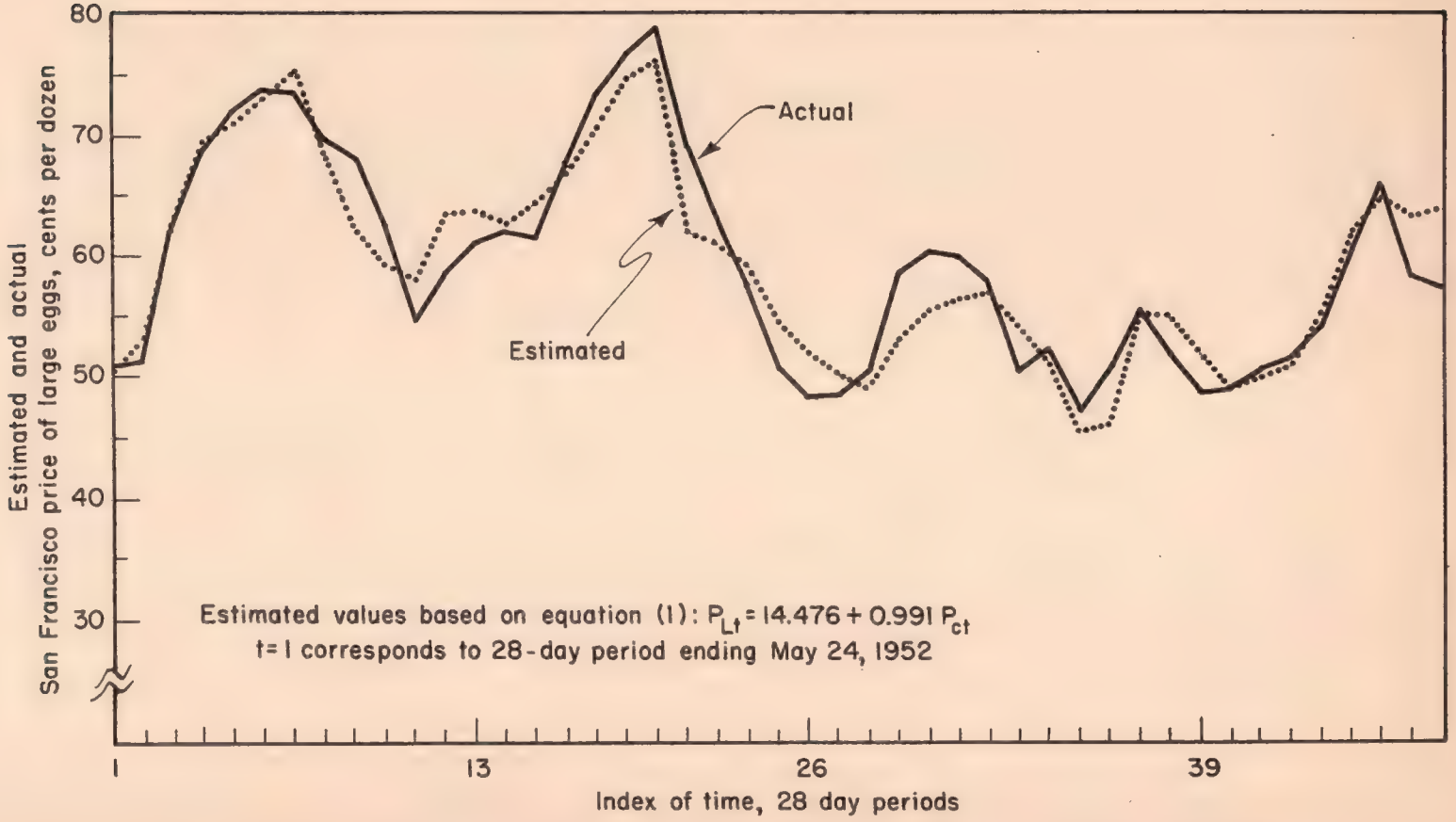

Figure 6. Estimated and Actual Prices of Large Eggs, San Francisco Bay Area, 1952-1955

This equation indicates that the price of small eggs varies directly with the price of large eggs in the same time period and inversely with per-capita sales of small eggs sold in the following time period. The use of per-capita small egg sales in the following time period rather than the same time period as the small egg price was suggested by the data. In a subsequent conversation with an officer of the PPCC, it was stated that prices of small eggs were adjusted in anticipation of changes in their supply. The coefficient associated with the local price of large eggs, 1.150, indicates that for a fixed quantity of small eggs the price of small eggs increases somewhat more rapidly than the price of large eggs. In other words, for a fixed quantity of small eggs, the spread between large and small egg prices is likely to be slightly narrower when the price of large eggs is high.

Equation (2) is illustrated in Figures 7 and 8. Figure 7 shows the estimated relationship between the price of small eggs and per-capita sales of small eggs when the price of large eggs is set equal to its average value during the period being analyzed. Figure 8 shows the estimated relationship between the price of small eggs and the price of large eggs when per-capita sales of small eggs is fixed at the average. The average difference between actual and estimated values of local small egg prices, P_{St}, is 2.87 cents per dozen.[1/]

The third estimating equation quantifies the relationship between per-capita sales of large eggs in the San Francisco Bay area and the local price of large eggs, the local price of small eggs, and per-capita income and time. Local per-capita sales of large eggs are estimated by inserting in the following equation the local price of large eggs, P_{Lt}; the local price of small eggs, P_{St}; per-capita income, Y_t; and time, T_t, where $T_1 = 1$ for the 28-day period ending May 24, 1952:

$$(3)\quad Q_{Lt} = 0.837 - 0.013\, P_{Lt} + 0.011\, P_{St} + 0.000748\, Y_t - 0.00346\, T_t.$$

The algebraic signs of the coefficients of equation (3) indicate that per-capita sales of large eggs vary directly with the price of small eggs and per-capita income and vary inversely with the price of large eggs and time. The coefficient of time, T_t, indicates that per-capita sales of large eggs by the two companies represented declined on the average 0.00346 dozens per person

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1/ Ibid.

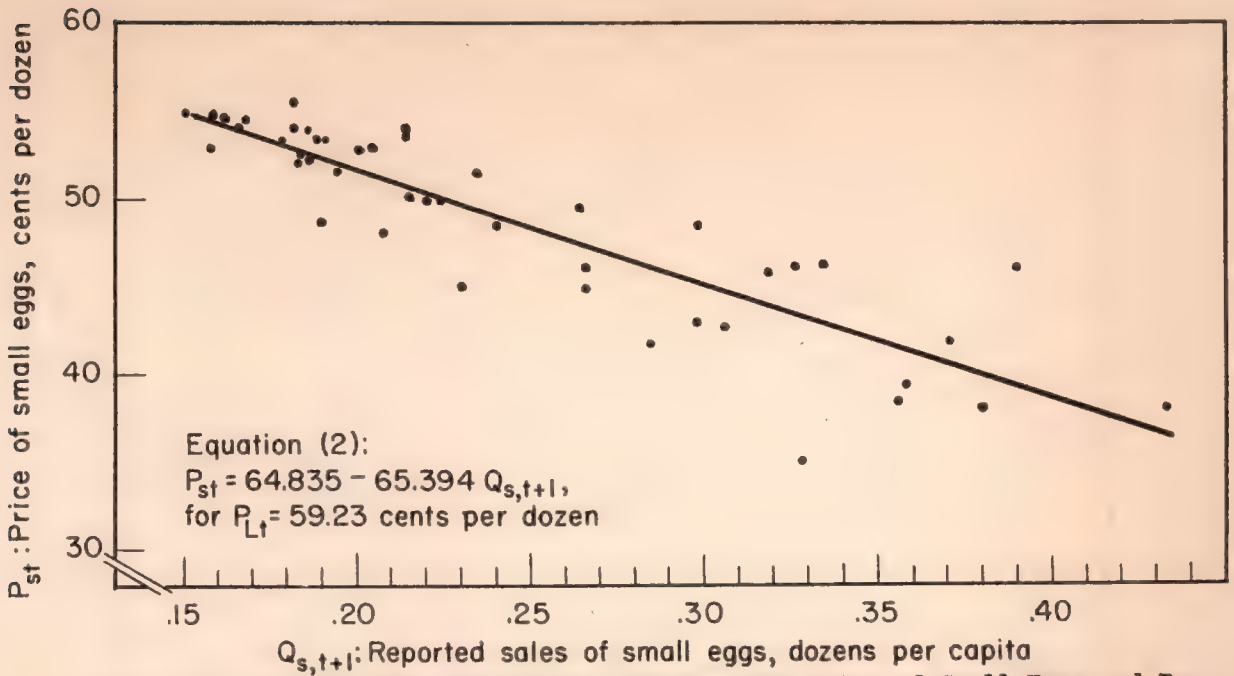

Figure 7. Average Net Relationship Between the Price of Small Eggs and Reported Per Capita Sales of Small Eggs in the Following Time Period

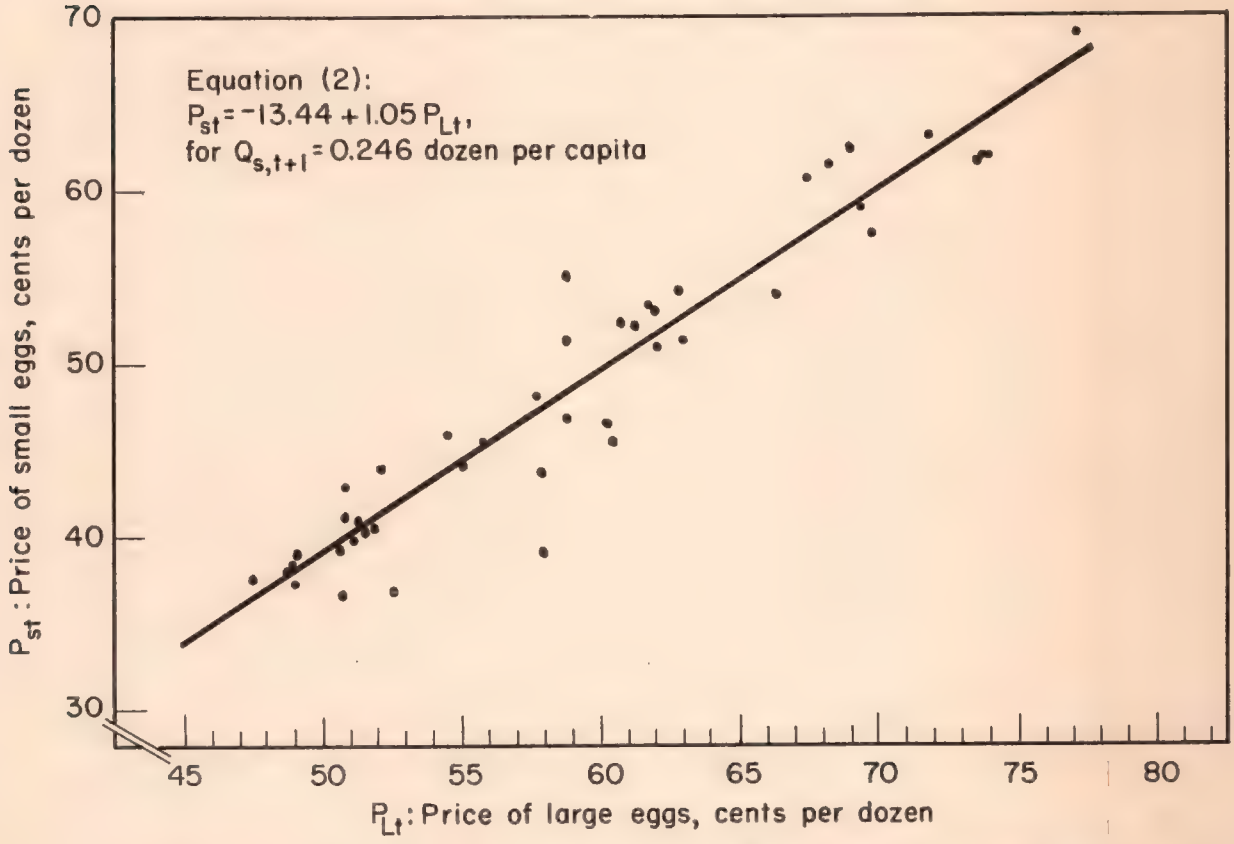

Figure 8. Average Net Relationship Between the Price of Small Eggs and the Price of Large Eggs

during the period analyzed. Although this trend might indicate only a declining proportion of total per-capita large egg sales by the two companies, a similar down trend has been noted for the total California as well as the national egg market.

The coefficient in equation (3) associated with per-capita income was found not to be statistically significant. Consequently, a second estimating equation, (3'), excluding per-capita income, was fitted to the data.

$$(3') \quad Q_{Lt} = 0.944 - 0.013\ P_{Lt} + 0.011\ P_{St} - 0.00329\ T_t$$

Figures 9 through 11 illustrate the net relationship between per-capita sales of large eggs and the price of large eggs, the price of small eggs, and time.

Percentage Relationships

The coefficients of the three estimating equations indicate the net effect on the estimated variable of a unit change of an explanatory variable if all the other explanatory variables were unchanged. Thus, the coefficient of P_{Lt} in equation (3'), -0.013, indicates that an increase in the price of large eggs of 1 cent per dozen has been associated with an average net decrease in per-capita large egg sales of 0.013 dozens per person. This number, of course, depends on the units of measurement and the proportion of total sales handled by the two companies represented. Providing only that the proportion of San Francisco Bay area sales handled by the two companies was reasonably constant during the period of analysis, it is possible to derive certain relationships that are independent of the units of measurement and that are also appropriate for the total market.

The first relationship is that between per-capita sales and income. Even though the coefficient associated with income was not statistically significant, it affords the only evidence based on these data that is available. With each of the other explanatory variables fixed at its average value, a 10-per cent increase (decrease) in per-capita income was associated with a 2.0-per cent increase (decrease) in per-capita sales of large eggs.

Similarly, with each of the other explanatory variables fixed at its average value, a 10-per cent increase (decrease) in the price of large eggs was associated with an average 13.5-per cent decrease (increase) in per-capita sales. A 10-per cent increase (decrease) in the price of small eggs was associated with an average 8.6-per cent increase (decrease) in per-capita sales of large eggs.

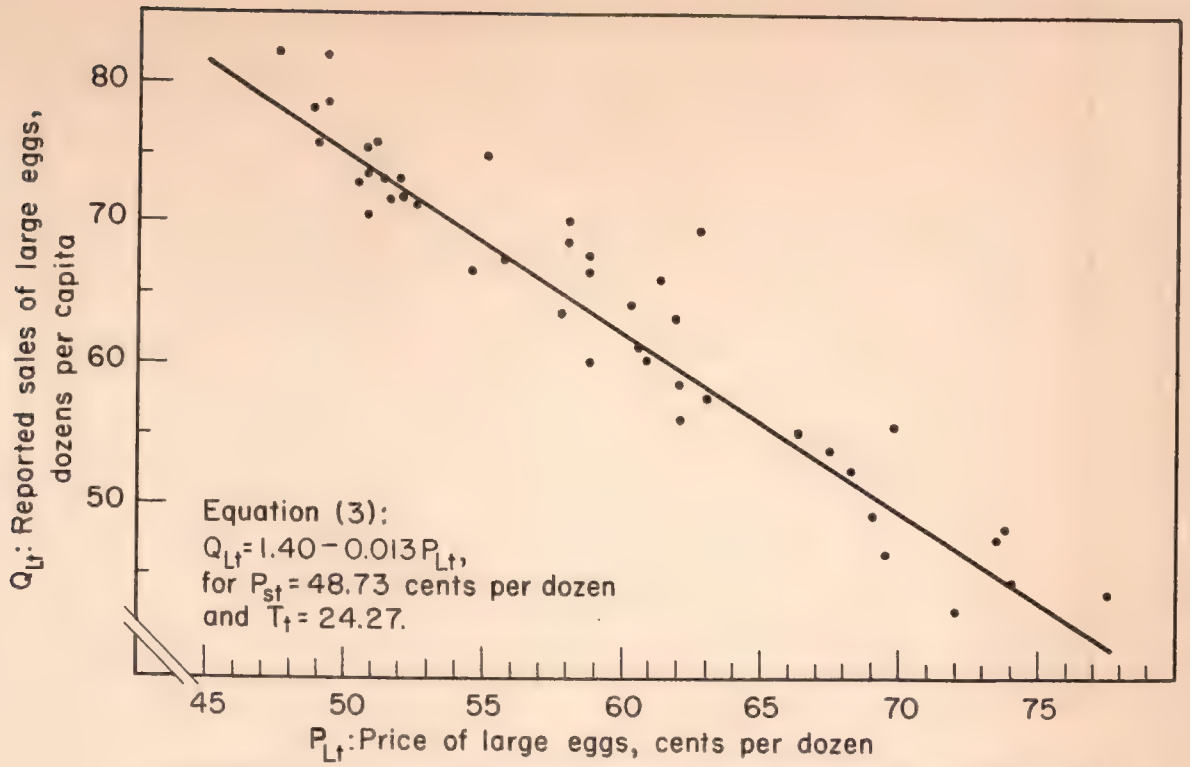

Figure 9. Average Net Relationship Between Per Capita Sales of Large Eggs and Price of Large Eggs

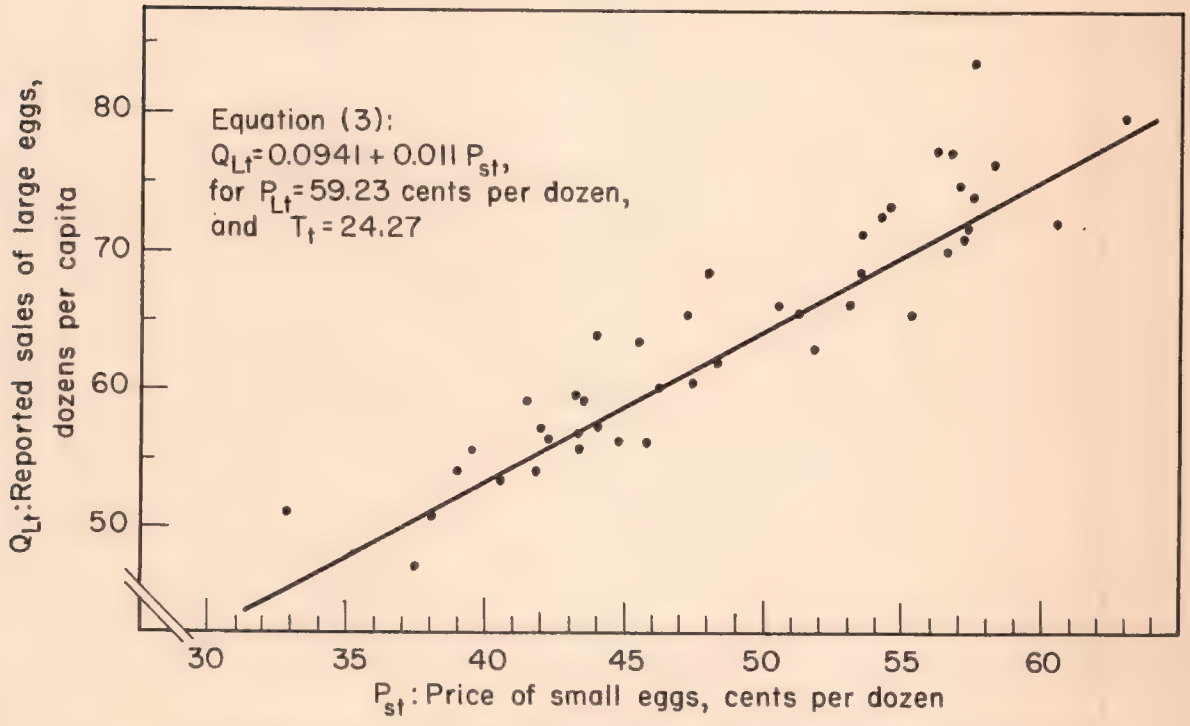

Figure 10. Average Net Relationship Between Per Capita Sales of Large Eggs and Price of Small Eggs

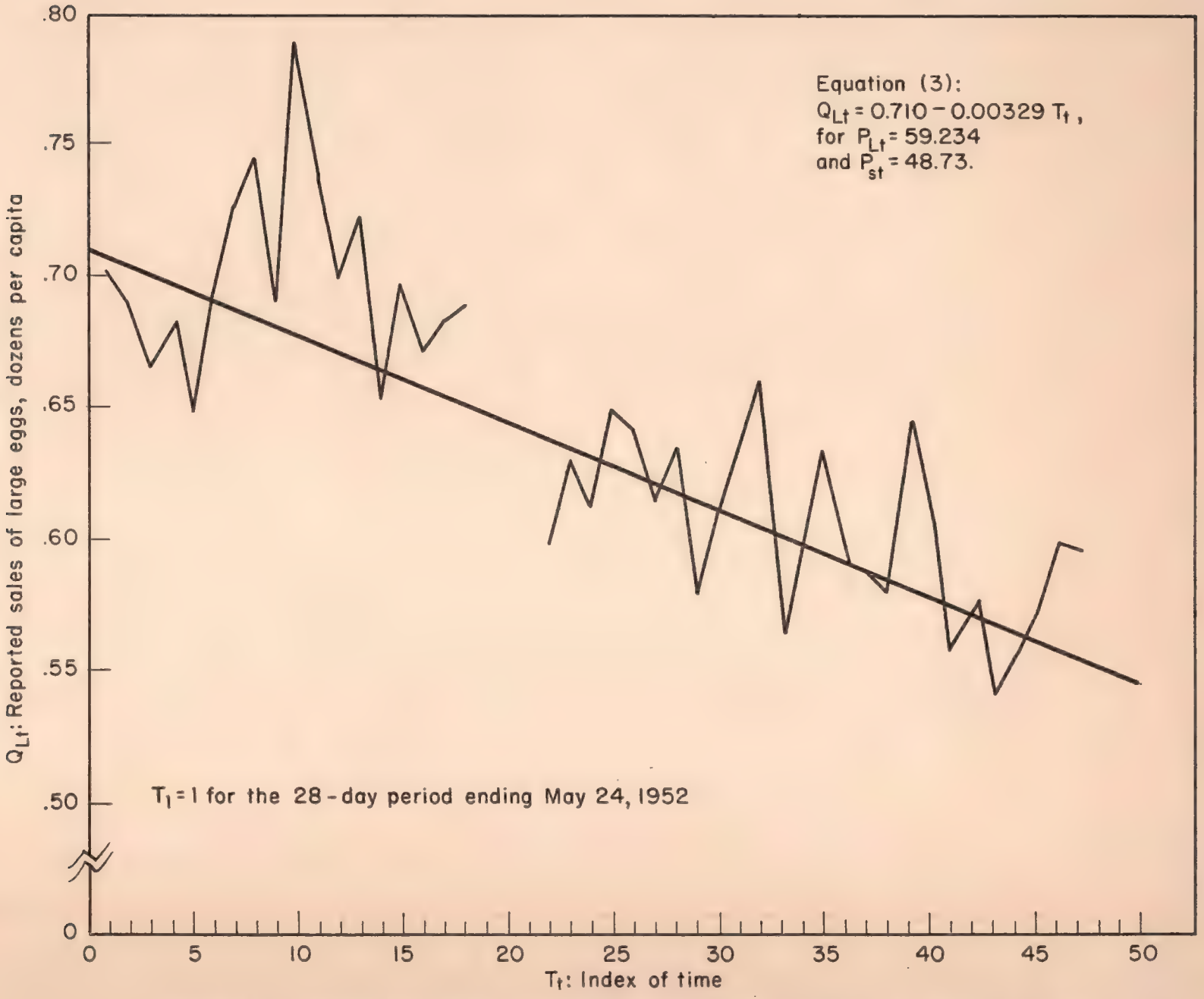

Figure 11. Average Net Relationship Between Per Capita Sales of Large Eggs and Time

Two percentage relationships are derived from equation (2). A 10-per cent increase (decrease) in per-capita sales of small eggs was associated with an average of 3.3-per cent decrease (increase) in the price of small eggs. A 10-per cent increase (decrease) in the price of large eggs was associated with an average 12.8-per cent increase in the price of small eggs.

Physical rates of exchange were also available from the fitted equations. The line of causation would be as follows: (1) an increase in the sales of small eggs would only be possible with a reduced price of small eggs and (2) the increased price spread would induce some consumers to reduce their consumption of large eggs. Presumably, the local price of large eggs, determined largely by the Midwest price, would not vary. The fitted equations imply that the rate of exchange is 1 dozen of small eggs for .75 dozen of large eggs. This may be compared with the minimum weights for one dozen large eggs and one dozen medium eggs, 24 and 21 ounces, respectively. A more accurate comparison would require an average minimum weight for medium and small eggs--the two sizes included in the "small" category. The computed rate of exchange implied a slight expansion in the weight of eggs consumed per capita as the quantity of small eggs consumed is increased.

Summary

Except for minor modifications, the statistical results are consistent with the tentative and generalized hypothesis previously formulated as to the operation of the San Francisco Bay area egg market. It is clear that, even though the prices analyzed are administered prices, they are closely related to and influenced by the same economic variables that would influence free market prices. Without a detailed analysis of each of the components that contribute to the average differential that has existed between San Francisco and Chicago large egg prices, it is not possible to say whether San Francisco prices have been higher or lower than would have been the case with free market prices. It is likely, however, that free market price relationships represent the minimum differential that can be sustained over time and that, if there has been any deviation, it has been in the direction of a larger differential and, thus, a higher average level of San Francisco prices.

The minor modifications referred to are:

(a) The use of the quantity of small eggs in the following time period to influence price in the current time period.

Two percentage relationships are derived from equation (2). A 10-per cent increase (decrease) in per-capita sales of beef was accompanied with an average of 3-per cent decrease (increase) in the price of beef. A 10-per cent increase (decrease) in the price of broiler eggs was associated with an average 10-per cent increase in the value of small eggs.

Physical terms of substitution also available from the fitted equations. The time of conversion would be as follows. (1) an increase in the price of beef would only be partially offset by a reduced price of broilers and (2) increased price spread would induce more people to reduce their consumption of large eggs. Presently, the local price of large eggs, determined largely by the Midwest price, would not vary. This limited operation, although one of existing is I focus of small eggs for .75 dozen of large eggs may be consumed when the minimum weights for one dozen large eggs are down to 21 ounces, respectively. A more accurate conversion would emphasize average uniform weight for medium and small eggs, not the two sizes included in the "all" categories. The computation were of value as empirical evidence to the weight of eggs consumed per capita or the quantity of small eggs consumed is increased.

It is for these reasons, the substitution is not consistent with the theories and postulated hypothesis commonly formulated to be the operation of the law of demand. They also may be obscure relationships between the prices analyzed (deflated prices), they are closely related to the average diet. Nutrient content between the two foods. It is not possible to say whether the demand prices have been different or lower than would have been the case with free market prices.

The following hypothesis is tested to see:

(a) the use of the "small" of small eggs in the following time periods.

to influence value in the current time period.

(b) The finding in equation (3) that for this relatively short time period consumer income was not an important variable in the determination of per-capita sales of large eggs.

(c) The finding in equation (3) and (3') that there has been a significant down trend in per-capita sales of large eggs.

It should be emphasized that the sales data refer only to the combined sales of PPCC and Brentwood. The derived equations, however, can be modified to reflect total sales if the sales of these two companies were a constant proportion of total sales and if the actual proportion were known. On the basis of rather tenuous evidence, it was estimated that in 1955 the combined share of PPCC and Brentwood was 42 per cent of the total market. Defining R_{Lt} and $R_{S,\ t+1}$ to represent total per-capita sales of large and small eggs in the San Francisco Bay area market:

$$Q_{Lt} = 0.42\ R_{Lt}, \text{ and } Q_{S,\ t+1} = 0.42\ R_{S,\ t+1}.$$

Equation (1) is unaffected by this change. Inserting these relationships into equations (2) and (3'), the following equations are derived:

$$(2)\quad P_{St} = 2.639 + 1.050\ P_{Lt} - 27.465\ R_{S,\ t+1}.$$

$$(3')\quad R_{Lt} = 2.248 - 0.031\ P_{Lt} + 0.026\ P_{St} - 0.00783\ T_t.$$

It should also be emphasized that, during the period of analysis, California and presumably the San Francisco Bay area were continually receiving eggs from the Midwest. This fact accounts for the relationship between San Francisco and Chicago large egg prices. There has been in recent years, however, a tendency for California egg production to increase more rapidly than California consumption. If this trend continued to the point where California is producing a surplus of large eggs that must find a market elsewhere, it is almost certain the differential will be reduced.

(b) The fitting in equation (3) must for this reason be slightly incorrect. However it was not an important error to in the determination of parameters needed at large eqns.

(c) The fitting in equation (3) and (3') that there has been a significant down fuel in (er-supply) sign of large eqns.

It should be emphasized that the above does refer only to the combined values of Tl(2) and Dem(2). The observed equations, however, can be modified to yield values for the sums of these two components as a consumer pump product of total value and the actual production were taken. On the basis of earlier calculations, it was estimated that in 1955 the combined element of [illegible] was 1/3 part coal of the total number. Letting q_{Tl} and q_{Dm} be the present total [illegible] rates of Tl and Dem in the [illegible] we have

$$q_{Tl} + 0.42\, q_{Dm} \text{ and } q_{Tl} - 0.42\, q_{Dm} = 0.42\, q_{Dm}, \text{ etc.}$$

Equation (1) [illegible] by [illegible] equations (2) and (3') the following equations are derived:

$$(2') \quad I_{Tl} = -0.209 + 0.092\, P_{Tl}^{t} - 27\, K_{Tl}^{t} + \text{etc.}$$

$$(3') \quad S_{Tl} = 0.263 - 0.\text{[illegible]}\, P_{Tl}^{t} + 0.052\, P_{Tl}^{t} - (0.0030)\, t^{2}.$$

It should also be mentioned that, during the years 1949 to 1954, [illegible] were [illegible] for the Ohio Bay area were [illegible] [illegible] [illegible]

Appendix

Data Preparation

It was not possible to find estimates of per-capita personal income for the San Francisco Bay area. The variable selected as an indicator of changes in personal income was California per-capita income based on quarterly estimates of personal income and annual estimates of population prepared by the California Department of Finance. Monthly estimates of California population were obtained by linear interpolation between the annual estimates (see Appendix Tables A-2 and A-3).

Annual population estimates for the five counties of the San Francisco Bay area were aggregated and linear interpolations calculated. These monthly estimates of population were then used to convert the sales data to per-capita sales.

The Chicago prices were monthly averages. Prices in adjacent months were weighted by the number of days in common with each 28-day period, and a new series was computed.

All of the data used in the regression analyses are listed in Appendix Table A-6.

The Statistical Model

The economic considerations discussed in the text suggested the following specification of a statistical model, a set of equations that simultaneously generate the interrelated endogenous economic variables, the price of large eggs, the price of small eggs, and the quantity of large eggs sold. Minor modifications were suggested by preliminary analysis of the data. The four exogenous variables are the price of large eggs in Chicago, the quantity of small eggs produced (and sold), consumer income, and time.

The set of equations used are as follows:

$$a_{11} P_{Lt} + a_{14} P_{Ct} = u_{1t} \qquad (1)$$

$$a_{21} P_{Lt} + a_{22} P_{St} + a_{25} Q_{S,\ t+1} = u_{2t} \qquad (2)$$

$$a_{31} P_{Lt} + a_{32} P_{St} + a_{33} Q_{Lt} + a_{36} T_t + a_{37} Y_t = u_{3t} \qquad (3)$$

where

P_{Lt} = local price of large eggs at time, t.

P_{St} = local price of small eggs at time, t.

Q_{Lt} = local per-capita sales of large eggs at time, t.

P_{Ct} = Chicago price of large eggs at time, t.

$Q_{S,\ t+1}$ = local per-capita sales of small eggs at time, t+1.

T_t = index of time.

Y_t = local per-capita income at time, t.

u_{it} = random variables, i = 1, 2, and 3.

In the system of equations, there are three endogenous variables, P_{Lt}, P_{St}, and Q_{Lt}; three exogenous variables, P_{Ct}, T_t, and Y_t; and one predetermined variable here treated as an exogenous variable, $Q_{S,\ t+1}$. Notice that the set of equations form a recursive system. Only one endogenous variable, P_{Lt}, appears in the first equation. Each successive equation introduces one additional endogenous variable.

For recursive systems of this kind, two rather simple computational procedures are available depending upon the specification of the statistical properties of the three sets of random variables. If the three random variables at time, t, are statistically independent, then each separate equation of the recursive system can be estimated using the least-squares procedure. If the three random variables at time, t, are not statistically independent, then the first equation can be estimated using least squares; and then the calculated values of the endogenous variable in the first equation is used as an independent variable in the second equation and the least-squares procedure used once again. Calculated values of the first two endogenous variables are then inserted in the third equation, and the least-squares procedure is applied once more.

Only the first procedure was completed--each equation was fitted separately by least squares. However, the second procedure was also followed for the first two equations. At least some intuitive support for separate least-squares fitting was obtained when it was noted that in both cases the correlation between residuals of the two fitted equations was not significantly different from zero.

I_{it} = [illegible]

P_{jt} = local price of small eggs at time, t_2

P_{kt} = local price-quota ratios of large eggs at time, t_1.

P_{jt} = Chicago price of large eggs at time, t_1.

Q_{it-1} = local i-supply ratios of small eggs at time, $t-1$.

T_t = index of t_1.

X_{it} = local per-capita income at time, t_2.

Y_{it} = random variables, $i = 1, 2,$ and 3.

If the system of equations, there are three endogenous variables Y_{1t}, Y_{2t}, and Y_{3t}; three exogenous variables, P_{jt}, T_t, and Y_{it-1}; and one predetermined variable that treated as an exogenous variable, Q_{it-1}. Notice that the set of equations form a recursive system. Only one endogenous variable appears on the left-hand side of each equation, two per simultaneous equations are available during which the specification of the structural properties of the three sets of random variables. If the three random variables at time, t, are stochastically independent, the ordinary sequence equation of the recursive system can be estimated using the least-squares procedure. If the three random variables at time, t are not stochastically independent, then the first equation can be estimated using least squares and then the remaining two equations by an endogenous variable in the first equation is treated as one again. Information values of the first two endogenous variables are then inserted in the third equation, and the least-squares procedure is applied on it.

Only the first procedure was completed--each equation was fitted separately by least squares. Next Y_1 the second procedure was also followed for the first two equations. At least some intuitive support for separate least-squares fitting was obtained when it was noted that in both cases the correlation between residuals of the two fitted equations was not significantly different from

APPENDIX TABLE A-1

Egg Sales and Average Prices Paid by Retailers During 28-Day Periods
By Size and Grade, San Francisco Bay Area

28-day period ending	28-day sales of eggs by grade and size[a]				28-day average price paid by retailers by grade and size[b]			
	Large AA	Large A	Medium A	Small A	Large AA	Large A	Medium A	Small A
	1	2	3	4	5	6	7	8
	million dozens				cents per dozen			
1952								
May 24	1.213	0.522	0.354	0.053	51.8	48.7	45.5	34.5
June 21	1.189	0.449	0.372	0.087	52.2	49.6	44.1	32.1
July 19	1.098	0.421	0.394	0.121	63.0	59.8	56.1	37.5
August 16	1.055	0.424	0.398	0.153	70.0	66.4	61.3	44.4
September 13	0.965	0.311	0.591	0.178	73.3	68.0	59.0	42.4
October 11	0.966	0.315	0.616	0.243	75.4	69.5	59.4	38.2
November 8	1.065	0.328	0.623	0.255	74.3	71.7	60.7	39.4
December 6	1.186	0.415	0.706	0.123	70.2	68.6	57.8	46.9
1953								
January 3	1.206	0.492	0.559	0.057	69.1	66.5	63.9	54.5
January 31	1.399	0.554	0.469	0.049	63.6	60.3	58.0	51.7
February 28	1.349	0.484	0.403	0.050	55.4	53.4	48.9	41.5
March 28	1.329	0.444	0.378	0.052	59.2	57.1	54.7	44.2
April 25	1.328	0.502	0.436	0.062	61.8	59.8	57.4	49.7
May 23	1.204	0.457	0.392	0.036	62.6	60.6	57.7	48.0
June 20	1.237	0.466	0.394	0.046	62.7	59.6	55.6	43.3
July 18	1.013	0.540	0.448	0.106	69.6	63.7	60.4	44.8
August 15	0.924	0.485	0.486	0.215	75.4	70.1	63.7	44.8
September 12	0.841	0.458	0.443	0.281	78.7	73.9	66.2	42.6
October 10	0.836	0.371	0.744	0.278	81.2	74.5	61.8	42.7
November 7	-- [c]	--	--	--	76.4	71.9	60.7	48.4
December 5	--	--	--	--	68.7	66.6	56.1	50.0

(Continued on next page.)

Appendix Table A-1 continued.

28-day period ending	28-day sales of eggs by grade and size[a]				28-day average price paid by retailers by grade and size[b]			
	Large AA	Large A	Medium A	Small A	Large AA	Large A	Medium A	Small A
	1	2	3	4	5	6	7	8
	million dozens				cents per dozen			
1954								
January 2	1.048	0.374	0.477	0.082	70.9	65.0	62.1	51.8
January 30	1.200	0.393	0.459	0.065	63.8	60.1	57.7	51.7
February 27	1.300	0.321	0.329	0.050	58.1	56.5	54.0	46.9
March 27	1.317	0.353	0.356	0.053	51.7	48.3	44.5	37.8
April 24	1.361	0.326	0.371	0.077	49.1	47.0	43.2	36.9
May 22	1.270	0.312	0.382	0.048	49.7	45.5	41.8	31.3
June 19	1.174	0.356	0.403	0.063	52.1	46.3	40.6	30.0
July 17	0.912	0.418	0.426	0.075	61.7	52.6	48.4	30.6
August 14	0.971	0.310	0.511	0.104	62.7	54.2	45.9	30.2
September 11	0.984	0.266	0.525	0.159	61.2	56.6	43.0	27.6
October 9	1.000	0.231	0.673	0.185	59.3	53.1	36.3	24.4
November 6	1.115	0.220	0.656	0.137	51.2	48.9	34.1	25.6
December 4	1.181	0.183	0.697	0.091	52.8	50.3	38.8	32.0
1955								
January 1	1.494	0.216	0.506	0.052	47.9	45.9	42.1	36.0
January 29	1.300	0.322	0.411	0.048	51.9	48.7	46.9	41.0
February 26	1.209	0.393	0.354	0.039	56.2	54.1	51.7	45.6
March 26	1.318	0.305	0.345	0.036	52.5	50.4	48.8	43.1
April 23	1.467	0.296	0.392	0.053	49.4	46.8	44.6	39.6
May 21	1.396	0.256	0.372	0.037	49.6	46.6	44.0	36.0
June 18	1.198	0.293	0.372	0.035	51.9	45.1	44.0	36.0
July 16	1.230	0.244	0.398	0.050	52.4	48.0	43.5	36.0
August 13	1.089	0.273	0.472	0.054	55.6	50.5	46.0	33.6
September 10	1.053	0.226	0.570	0.075	61.5	57.0	49.1	33.9
October 8	1.016	0.206	0.630	0.151	67.1	61.7	53.9	35.9
November 5	1.187	0.211	0.633	0.099	59.2	56.8	47.1	36.6
December 3	1.281	0.185	0.588	0.067	58.1	56.3	48.5	38.0
December 31	1.417	0.248	0.427	0.045	64.8	63.3	61.7	52.0

a/ Figures are rounded.
b/ Simple average of daily prices.
c/ Dashes indicate no data available.

Sources:
Cols. 1-4: From PPCC and Brentwood records.
Cols. 5-8: From PPCC records.

APPENDIX TABLE A-2

California Personal Income by Quarters, 1952-1955

Quarter	1952	1953	1954	1955	1954	1955
	1	2	3	4	5	6
	million dollars					
First	5,364	5,915	5,988	6,452	6,377	6,740
Second	5,588	6,111	6,073	6,727	6,498	7,028
Third	5,871	6,222	6,220	6,907	6,529	7,216
Fourth	6,434	6,608	6,669	6,994	6,661	7,307

Sources:

Cols. 1-3: California Department of Finance, Income Payments in California /1946-1954/ (Sacramento: 1955). Processed. Income payments include: (1) wages and salaries, (2) proprietor's income, (3) property income, and (4) other income.

Col. 4: In order to obtain a continuous series, the 1954 figures were added for the data under column 3 and column 5; and the ratio of the two totals, 0.95722, was used to multiply the figures for 1955 (column 6).

Cols. 5 and 6: California Department of Finance, California Personal Income (Sacramento: 1956), pp. 2-3. Processed. The original data was quarterly personal income in California at annual rates. In order to make this series comparable to the above, (1) wage and salary disbursements, (2) other labor income, (3) proprietor's income, and (4) property income were added and divided by 4 to convert into the corresponding quarterly rate.

Third	5,304	5,245	5,240	6,42	6,172
Fourth	5,000	5,411	5,273	5,721	6,,25
Third	5,172	6,,242	5,,200	5,,507	6,,42)
Fourth	6,,534	5,,203	5,,249	6,,294	6,,201

Note 1-3:

Col. 4:

Col. 5 and 6:

APPENDIX TABLE A-3

California and San Francisco Bay Area
Population, July 1, 1951-1956

Area	1951	1952	1953	1954	1955	1956
	1	2	3	4	5	6
	millions of persons					
California	11.058	11.743	12.168	12.595	13.035	13.600
Counties						
Alameda	.758	.793	.808	.842	.853	.862
Contra Costa	.318	.342	.357	.341	.343	.346
Marin	.092	.096	.101	.107	.113	.121
San Francisco	.776	.792	.796	.798	.795	.783
San Mateo	.254	.276	.295	.316	.337	.358
San Francisco Bay area[a/]	2.198	2.299	2.357	2.404	2.441	2.470

a/ Calculated by summing the five county figures.

Sources:

Cols. 1-4: California Department of Finance, Estimated Population of California's Areas and Counties, 1950-1955 (Sacramento: 1955), Table 6. Processed.

Col. 5: Ibid., Table 5.

Col. 6: California Department of Finance, Population of California's Areas and Counties in 1957 (Sacramento: 1957), Table 6. Processed.

APPENDIX TABLE A-4

Shell Eggs, Average Wholesale Prices of Large Extras at Chicago, by Months, 1952-1955

Month	1952	1953	1954	1955
	1	2	3	4
	cents per dozen			
January	39.77	45.38	47.21	33.40
February	36.42	44.34	45.02	42.17
March	38.24	49.53	40.34	40.98
April	39.56	49.74	38.04	37.26
May	35.89	48.56	35.49	34.63
June	40.40	51.07	35.07	36.85
July	--a/	53.41	41.94	37.02
August	--	59.15	41.57	46.36
September	56.02	62.76	44.26	51.36
October	63.60	61.26	40.85	49.54
November	56.04	54.32	38.11	50.11
December	48.94	47.86	31.70	51.39

a/ Dashes indicate no data available.

Sources:

Col. 1: U. S. Production and Marketing Administration, Dairy and Poultry Market Statistics, 1952 (Washington, D. C.: 1953), Table 87.

Cols. 2-4: U. S. Agricultural Marketing Service, Dairy and Poultry Market Statistics (Washington, D. C.: annual issues).

The prices used are those listed for large extras (minimum 60-per cent A quality) and are averages of prices for white, brown, and mixed color eggs.

APPENDIX TABLE A-5

Weighted Average Prices and Aggregate Quantities of "Large" and "Small" Eggs Sold, by 28-Day Periods San Francisco Bay Area

28-day period ending	P_L [a]	P_S [b]	Q_L [c]	Q_S [d]
	cents per dozen		million dozens	
1952				
May 24	50.8	44.1	1.735	.407
June 21	51.5	41.8	1.638	.459
July 19	62.1	51.7	1.519	.515
August 16	69.0	56.6	1.479	.551
September 13	72.0	55.2	1.276	.769
October 11	73.9	53.4	1.281	.859
November 8	73.7	54.5	1.393	.878
December 6	69.8	56.2	1.601	.829
1953				
January 3	68.3	63.0	1.698	.616
January 31	62.7	57.4	1.953	.518
February 28	54.9	48.1	1.833	.453
March 28	58.7	53.4	1.773	.430
April 25	61.3	56.4	1.830	.498
May 23	62.0	56.9	1.661	.428
June 20	61.8	54.3	1.703	.440
July 18	67.5	57.4	1.553	.554
August 15	73.6	57.9	1.409	.701
September 12	77.0	57.0	1.299	.724
October 10	79.1 [e]	56.6	1.207	1.022
November 7	--	--	--	--
December 5	--	--	--	--
1954				
January 2	69.4	60.6	1.422	.559
January 30	63.0	56.9	1.593	.524
February 27	57.8	53.1	1.621	.379
March 27	51.0	43.6	1.670	.409
April 24	48.7	42.1	1.687	.448
May 22	48.9	40.6	1.582	.430
June 19	50.7	39.0	1.530	.466
July 17	58.8	45.7	1.330	.501
August 14	60.6	43.2	1.281	.615
September 11	60.2	39.4	1.250	.684
October 9	58.1	33.8	1.231	.858
November 6	50.8	37.6	1.335	.793
December 4	52.5	38.0	1.364	.788

(Continued on next page.)

Appendix Table A-5 continued.

28-day period ending	P_L a/	P_S b/	Q_L c/	Q_S d/
	cents per dozen		million dozens	
1955				
January 1	47.6	41.5	1.710	.558
January 29	51.2	46.3	1.622	.459
February 26	55.7	51.2	1.602	.393
March 26	52.1	48.2	1.623	.381
April 23	49.0	44.0	1.763	.445
May 21	49.1	43.3	1.652	.409
June 18	50.6	43.3	1.491	.407
July 16	51.7	42.2	1.474	.448
August 13	54.6	44.7	1.362	.526
September 10	60.7	47.4	1.279	.645
October 8	66.2	50.4	1.222	.781
November 5	58.8	45.6	1.398	.732
December 3	57.9	47.2	1.466	.655
December 31	64.7	60.8	1.665	.472

a/ The weighted average price of large eggs was obtained from the data listed in Appendix Table A-1 by using the sales of Large AA and Large A eggs as weights applied to the corresponding prices.

b/ The weighted average price of small eggs was obtained from the data listed in Appendix Table A-1 by using the sales of Medium A and Small A as weights applied to the corresponding prices.

c/ Aggregate sales of Large AA and Large A eggs. Based on data in Appendix Table A-1.

d/ Aggregate sales of Medium A and Small A eggs. Based on data in Appendix Table A-1.

e/ Dashes indicate no data available.

a/ The weighted average price of large eggs was obtained from the data listed in Appendix Table A-1 by averaging the prices of large AA and large A eggs according to the corresponding quantities of those eggs.

b/ The weighted average price of small eggs was obtained from the data listed in Appendix Table A-1 in exactly the same manner as that described in footnote a/ above, except that the weights applied to the corresponding prices were those of small A and small B eggs.

c/ Average price of large AA and large A eggs. Based on data in Appendix Table A-1.

d/ Approximate value of Medium A and Small A eggs. Based on data in Appendix Table A-1.

e/ Unavailable.

APPENDIX TABLE A-6

Data Used in Regression Analyses

28-day period ending	T[a]	P_L[b]	P_S[b]	Q_L[c]	$Q_{S, t+1}$[c]	Y[d]	P_C
		cents per dozen		dozens of eggs per capita		dollars per capita	cents per dozen
1952							
May 24	1	50.8	44.1	.760	.200	160	36.4
June 21	2	51.5	41.8	.715	.224	160	39.3
July 19	3	62.1	51.7	.661	.239	166	48.4
August 16	4	69.0	56.6	.642	.333	166	55.3
September 13	5	72.0	55.2	.553	.371	166	56.9
October 11	6	73.9	53.4	.554	.379	180	59.0
November 8	7	73.7	54.5	.601	.357	180	61.4
December 6	8	69.8	56.2	.689	.265	180	54.5
1953							
January 3	9	68.3	63.0	.729	.223	164	48.6
January 31	10	62.7	57.4	.839	.194	164	45.4
February 28	11	54.9	48.1	.786	.184	164	44.3
March 28	12	58.7	53.4	.758	.213	164	49.5
April 25	13	61.3	56.4	.781	.182	168	49.7
May 23	14	62.0	56.9	.708	.187	168	48.8
June 20	15	61.8	54.3	.724	.235	168	50.4
July 18	16	67.5	57.4	.659	.297	170	52.9
August 15	17	73.6	57.9	.597	.306	170	56.7
September 12	18	77.0	57.0	.549	.431	170	60.7
October 10	--[e]	--	--	--	--	--	--
November 7	--	--	--	--	--	--	--
December 5	--	--	--	--	--	--	--

(Continued on next page.)

Appendix Table A-6 continued.

28-day period ending	T [a]	P_L [b]	P_S [b]	Q_L [c]	$Q_{S, t+1}$ [c]	Y [d]	P_C
		cents per dozen		dozens of eggs per capita		dollars per capita	cents per dozen
1954							
January 2	22	69.4	60.6	.597	.220	161	47.8
January 30	23	63.0	56.9	.669	.159	161	47.2
February 27	24	57.8	53.1	.680	.171	161	45.1
March 27	25	51.0	43.6	.699	.187	161	40.5
April 24	26	48.7	42.1	.705	.179	161	38.4
May 22	27	48.9	40.6	.660	.194	161	36.0
June 19	28	50.7	39.0	.638	.208	161	35.2
July 17	29	58.8	45.7	.553	.391	164	39.2
August 14	30	60.6	43.2	.532	.284	164	41.8
September 11	31	60.2	39.4	.519	.356	164	42.6
October 9	32	58.1	33.8	.510	.328	174	43.2
November 6	33	50.8	37.6	.553	.326	174	40.3
December 4	34	52.5	38.0	.564	.230	174	37.2
1955							
January 1	35	47.6	41.5	.706	.189	167	31.8
January 29	36	51.2	46.3	.669	.162	167	33.4
February 26	37	55.7	51.2	.660	.157	167	41.5
March 26	38	52.1	48.2	.668	.183	167	41.1
April 23	39	49.0	44.0	.725	.168	173	37.9
May 21	40	49.1	43.3	.678	.167	173	35.3
June 18	41	50.6	43.3	.612	.184	173	36.1
July 16	42	51.7	42.2	.604	.215	176	37.0
August 13	43	54.6	44.7	.558	.264	176	41.4
September 10	44	60.7	47.4	.523	.319	176	48.2
October 8	45	66.2	50.4	.499	.299	176	50.8
November 5	46	58.8	45.6	.570	.267	176	49.6
December 3	47	57.9	47.2	.598	.192	176	50.2

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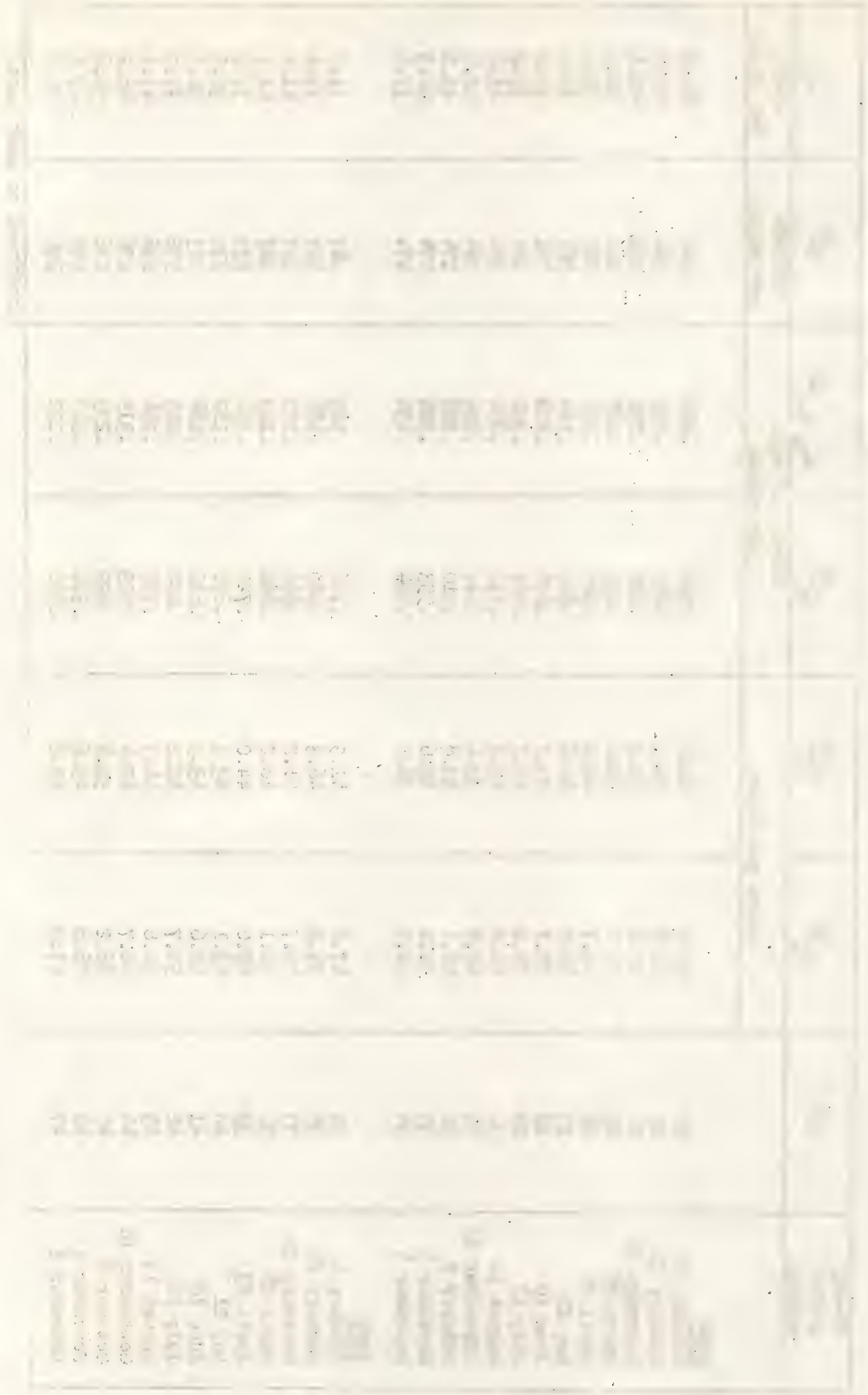

Appendix Table A-6 continued.

a/ Time, measured in 28-day periods.

b/ See Appendix Table A-5.

c/ Monthly estimates of San Francisco Bay area population were obtained by linear interpolation between the estimates given in Appendix Table A-3. Egg sales from Appendix Table A-5 were divided by corresponding population estimates to obtain estimates of per-capita sales.

d/ California personal income by quarters in Appendix Table A-2 was divided by 3 to obtain a rough measure of monthly income. This was further divided by the corresponding estimate of California population obtained by linear interpolation with the estimates from Appendix Table A-3.

e/ Dashes indicate no data available.

APPENDIX TABLE A-7

Summary of Regression Equations

Regression equation	Dependent variable	Constant term	Independent variables[a/]							Adjusted multiple correlation coefficient
			P_{Lt}	P_{St}	Q_{Lt}	P_{Ct}	$Q_{S, t+1}$	Y_t	T_t	
(1)	P_{Lt}	14.476				0.991 (16.547)				.931
(2)	P_{St}	2.639	1.050 (15.925)[b/]				-65.394 (8.934)			.925
(3)	Q_{Lt}	.837	-0.013 (11.726)	0.011 (9.498)				0.000748 (0.703)	-0.00346 (6.806)	.913
(3')	Q_{Lt}	.944	-0.013 (13.043)	+0.011 (9.588)					-0.00329 (7.479)	.914

[a/] P_{Lt} = local price of large eggs at time, t.

P_{St} = local price of small eggs at time, t.

Q_{Lt} = local per-capita sales of large eggs at time, t.

P_{Ct} = Chicago price of large eggs at time, t.

$Q_{S, t+1}$ = local per-capita sales of small eggs at time, t+1.

Y_t = local per-capita income at time, t.

T_t = index of time, T_1 = 1 for the 28-day period ending on May 24, 1952.

[b/] Figures in parentheses below the regression coefficients are associated observed values of the t random variable.

APPENDIX TABLE A-8

Ratios of Prices of Large A, Medium A, and
Small A Eggs to Large AA Egg Prices
San Francisco Bay Area, 1952-1955

28-day period ending	$\frac{P_{LA}}{P_{LAA}}$	$\frac{P_{MA}}{P_{LAA}}$	$\frac{P_{SA}}{P_{LAA}}$
1952			
May 24	.942	.880	.667
June 21	.950	.845	.582
July 19	.949	.887	.595
August 16	.949	.874	.634
September 13	.928	.805	.578
October 11	.923	.789	.507
November 8	.965	.816	.532
December 6	.977	.823	.671
1953			
January 3	.962	.925	.789
January 31	.951	.915	.813
February 28	.964	.883	.749
March 28	.965	.923	.802
April 25	.968	.929	.803
May 23	.968	.922	.765
June 20	.951	.887	.691
July 18	.922	.868	.647
August 15	.930	.845	.594
September 12	.939	.841	.541
October 10	.917	.761	.526
November 7	.930	.794	.633
December 5	.970	.817	.728
1954			
January 2	.916	.875	.730
January 30	.942	.904	.810
February 27	.972	.929	.807
March 27	.934	.872	.731
April 24	.957	.880	.752
May 22	.915	.841	.630
June 19	.889	.779	.576
July 17	.853	.784	.496
August 14	.864	.730	.482
September 11	.925	.703	.451
October 9	.895	.614	.411
November 6	.957	.667	.501
December 4	.964	.743	.613

(Continued on next page.)

Period ending	[illegible]	[illegible]	[illegible]
1962			
[illegible] 24	.346	.[illegible]	.[illegible]
June 27	.[illegible]	.[illegible]	.[illegible]
July 19	.[illegible]	.[illegible]	.[illegible]
August 16	.[illegible]	.[illegible]	.[illegible]
September 13	.[illegible]	.[illegible]	.[illegible]
October 11	.[illegible]	.[illegible]	.[illegible]
November 8	.[illegible]	.[illegible]	.[illegible]
December 6	.[illegible]	.[illegible]	.[illegible]
1963			
[illegible] 3	.[illegible]	.[illegible]	.[illegible]
[illegible] 31	.[illegible]	.[illegible]	.[illegible]
February [illegible]	.[illegible]	.[illegible]	.[illegible]
[illegible] 28	.[illegible]	.[illegible]	.[illegible]
April 25	.[illegible]	.[illegible]	.[illegible]
May 23	.[illegible]	.[illegible]	.[illegible]
June 20	.[illegible]	.[illegible]	.[illegible]
July 18	.[illegible]	.[illegible]	.[illegible]
[illegible] 15	.[illegible]	.[illegible]	.[illegible]
September 12	.[illegible]	.[illegible]	.[illegible]
October 10	.[illegible]	.[illegible]	.[illegible]
November 7	.[illegible]	.[illegible]	.[illegible]
December 5	.[illegible]	.[illegible]	.[illegible]
1964			
January 2	.[illegible]	.[illegible]	.[illegible]
January 30	.[illegible]	.[illegible]	.[illegible]
February [illegible]	.[illegible]	.[illegible]	.[illegible]
March 26	.[illegible]	.[illegible]	.[illegible]
April 23	.[illegible]	.[illegible]	.[illegible]
May 21	.[illegible]	.[illegible]	.[illegible]
June 18	.[illegible]	.[illegible]	.[illegible]
July 16	.[illegible]	.[illegible]	.[illegible]
August 13	.[illegible]	.[illegible]	.[illegible]
September 10	.[illegible]	.[illegible]	.[illegible]
October 8	.[illegible]	.[illegible]	.[illegible]
November 5	.[illegible]	.[illegible]	.[illegible]
December 3	.[illegible]	.[illegible]	.[illegible]

[illegible]

Appendix Table A-8 continued.

28-day period ending	$\frac{P_{LA}}{P_{LAA}}$	$\frac{P_{MA}}{P_{LAA}}$	$\frac{P_{SA}}{P_{LAA}}$
1955			
January 1	.958	.879	.752
January 29	.938	.904	.790
February 26	.963	.922	.811
March 26	.960	.930	.821
April 23	.947	.903	.802
May 21	.947	.894	.732
June 18	.869	.848	.694
July 16	.923	.830	.688
August 13	.908	.827	.604
September 10	.927	.797	.551
October 8	.920	.803	.535
November 5	.959	.794	.618
December 3	.969	.831	.654
December 31	.977	.952	.802

Source: See Appendix Table A-1.

APPENDIX TABLE A-9

Ratios of the Sales of Large A, Medium A,
and Small A Eggs to Large AA Sales
San Francisco Bay Area, 1952-1955

28-day period ending	$\frac{Q_{LA}}{Q_{LAA}}$	$\frac{Q_{MA}}{Q_{LAA}}$	$\frac{Q_{SA}}{Q_{LAA}}$
1952			
May 24	.430	.292	.0435
June 21	.378	.313	.0735
July 19	.384	.359	.1016
August 16	.402	.377	.1455
September 13	.329	.612	.1840
October 11	.326	.638	.2515
November 8	.308	.585	.2399
December 6	.350	.595	.0957
1953			
January 3	.408	.463	.0473
January 31	.396	.335	.0420
February 28	.359	.299	.0368
March 28	.334	.284	.0392
April 25	.378	.329	.0466
May 23	.380	.326	.0303
June 20	.376	.319	.0375
July 18	.533	.442	.1043
August 15	.525	.526	.2332
September 12	.545	.527	.3339
October 10	.444	.890	.3325
November 7	.349	.722	.1614
December 5	.304	.514	.0868
1954			
January 2	.357	.455	.0781
January 30	.328	.383	.0545
February 27	.247	.253	.0388
March 27	.268	.270	.0400
April 24	.240	.273	.0569
May 22	.246	.301	.0617
June 19	.303	.352	.0535
July 17	.459	.467	.0824
August 14	.320	.526	.1067
September 11	.270	.534	.1618
October 9	.231	.673	.1846
November 6	.197	.589	.1238
December 4	.155	.590	.0772

(Continued on next page.)

APPENDIX TABLE A-9

Ratios of the Sales of Large A, Medium A, and Small A Eggs to Large AA Sales San Francisco Bay Area, 1952-1955

28-day period ending	$\frac{Q_{LA}}{Q_{LAA}}$	$\frac{Q_{MA}}{Q_{LAA}}$	$\frac{Q_{SA}}{Q_{LAA}}$
1952			
May 24	.430	.292	.0435
June 21	.375	.313	.0735
July 19	.384	.359	.1015
August 16	.402	.377	.1455
September 13	.329	.612	.1810
October 11	.326	.638	.2515
November 8	.308	.585	.2399
December 6	.350	.395	.0957
1953			
January 3	.408	.463	.0473
January 31	.336	.335	.0820
February 28	.359	.299	.0368
March 28	.334	.284	.0392
April 25	.376	.389	.0466
May 23	.380	.386	.0303
June 20	.376	.349	.0375
July 18	.533	.445	.1043
August 15	.525	.526	.2332
September 12	.545	.527	.3339
October 10	.444	.690	.3325
November 7	.349	.722	.1611
December 5	.304	.514	.0868
1954			
January 2	.357	.465	.0781
January 30	.388	.385	.0745
February 27	.247	.253	.0388
March 27	.268	.270	.0400
April 24	.280	.273	.0569
May 22	.246	.301	.0617
June 19	.303	.352	.0535
July 17	.459	.467	.0824
August 14	.320	.326	.1067
September 11	.270	.234	.1618
October 9	.231	.613	.1846
November 6	.197	.589	.1238
December 4	.155	.390	.0772

(Continued on next page.)

Appendix Table A-9 continued.

28-day period ending	$\frac{Q_{LA}}{Q_{LAA}}$	$\frac{Q_{MA}}{Q_{LAA}}$	$\frac{Q_{SA}}{Q_{LAA}}$
1955			
January 1	.145	.338	.0347
January 29	.247	.316	.0371
February 26	.326	.293	.0325
March 26	.231	.262	.0271
April 23	.202	.267	.0360
May 21	.183	.266	.0265
June 18	.245	.311	.0293
July 16	.198	.323	.0404
August 13	.251	.434	.0491
September 10	.215	.541	.0713
October 8	.203	.619	.1487
November 5	.178	.533	.0833
December 3	.144	.459	.0522
December 31	.175	.302	.0320

Source: See Appendix Table A-1.

Appendix Table A-9 continued.

28-day period ending	$\frac{\sigma_{LA}}{\sigma_{LAA}}$	$\frac{\sigma_{VA}}{\sigma_{LAA}}$	$\frac{\sigma_{EA}}{\sigma_{LAA}}$
1955			
January 1	.145	.338	.0347
January 29	.247	.316	.0172
February 26	.326	.293	.0325
March 26	.231	.262	.0271
April 23	.202	.267	.0360
May 21	.189	.266	.0285
June 18	.245	.311	.0293
July 16	.198	.323	.0404
August 13	.251	.434	.0491
September 10	.215	.341	.0213
October 8	.203	.619	.1487
November 5	.178	.533	.0833
December 3	.144	.459	.0522
December 31	.175	.302	.0340

Source: See Appendix Table A-1.